Indium Phosphide (InP) Integrated Photonics Evaluation (ACO: InP)

Completed Technology Project (2018 - 2020)

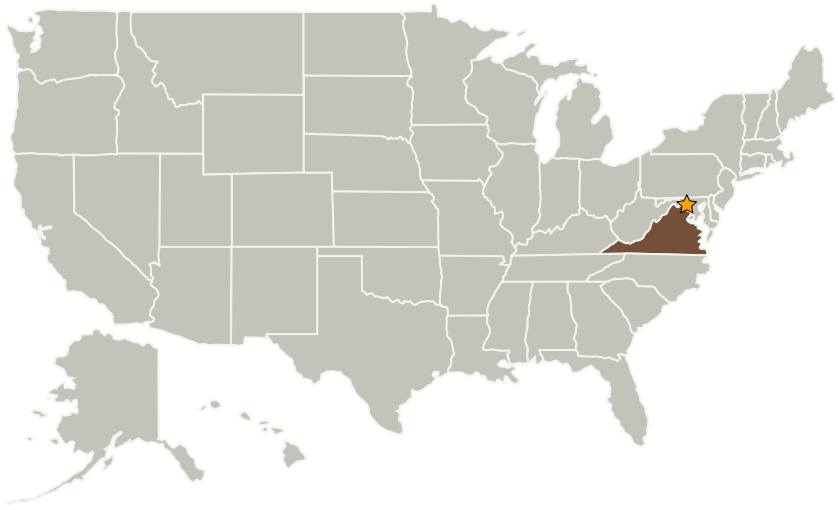
Project Introduction

The objective of this task is to utilize NASA GSFC's expertise and facilities to assess the space environmental durability of a commercial InP platform, developed by Freedom Photonics. The size, weight, and power benefits of a Photonic Integrated Circuit (PIC) could have a significant impact on missions relying on communication subsystems, in particular High Throughput Satellites in GEO, and cubesats. The use of commercial PICs instead of very expensive customized integrated packages and discrete components would be of benefit for both NASA and SSL in future optical payloads. The NASA GSFC Photonics Group is actively engaged in the evaluation and development of photonics technologies at the component level to meet the communications requirements of future NASA missions.

Anticipated Benefits

This collaboration between SSL and GSFC is a critical step for advancing the maturity of radiation hardened InP components for satellites and evaluating next generation integrated architectures of photonic components combined at the chip level into a single package. Integrated photonics has an enormous potential for significantly improving the performance of the system due to the close proximity of the functions, while also significantly reducing the size, weight, and power (SWAP).

Primary U.S. Work Locations and Key Partners



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Game Changing Development

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations
Virginia

Project Transitions

April 2018: Project Start

January 2020: Closed out

Closeout Summary: The component tested is a Freedom Photonics monolithic Indium Phosphide (InP) chip that integrates a widely tunable laser with a semiconductor optical amplifier. This component has been developed and commercialized for medical, laboratory, and terrestrial fiber applications. While it has been tested for terrestrial applications, testing necessary for its use in space systems has not been done to date. The integrated photonics within this component can be considered basic building blocks for other photonic circuits and information gained from this investigation can be applied to other InP based platforms using similar implementation.

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Game Changing Development

Project Management

Program Director:

Mary J Werkheiser

Program Manager:

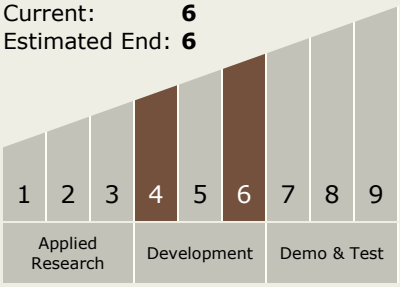
Gary F Meyering

Principal Investigator:

Melanie N Ott

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Target Destinations

The Moon, Mars, Earth